THE DISTRIBUTIONAL EFFECTS OF AN INCREASE IN SELECTED FEDERAL EXCISE TAXES

Staff Working Paper

January 1987

The Congress of the United States

Congressional Budget Office

J932-4

This study was prepared at the request of Senator George J. Mitchell of the Committee on Finance, United States Senate. It was written by Frank J. Sammartino of the Tax Analysis Division under the supervision of Rosemary D. Marcuss and Eric J. Toder. Questions regarding this analysis may be addressed to Frank J. Sammartino (226-2688).

Federal excise taxes accounted for $36 billion in 1985, or 5 percent of all federal revenues. Concern about the rising deficit has prompted some to consider increasing federal excise taxes. This analysis by the Congressional Budget Office shows the distributional effects, among income classes, of a simulated increase of $1 billion in gross excise tax revenues from separate increases in the excise tax on seven commodities: beer, wine, liquor, tobacco, gasoline, airfare, and telephone service.

The distributional effects of the tax increase are measured relative to family income and to total family expenditures. Because total expenditures generally are thought to reflect long-term incomes, total expenditures may be a better measure of a family's permanent economic situation than income in a single year.

When measuring the distributional effects relative to total expenditures, an increase in the airline ticket tax would be slightly progressive across income classes; the average increase in taxes as a percentage of total expenditures would be higher for families in higher income classes. Increases in the tax on wine or, for all but the highest and lowest income classes, the tax on gasoline would have the same effect on all income classes when measured as a percent of total expenditures. Increases in all other excise taxes would be at least marginally regressive; the average increase in taxes as a percentage of total expenditures would be less for families in higher income classes. An increase in the excise tax on tobacco would be the most regressive of all the tax increases considered.

When measuring the distributional effects relative to family income, an increase in any of the taxes except the airline ticket tax would be noticeably regressive. The average increase in taxes as a percentage of total income would be about twice as large (more than three times as large in the case of the tax on beer or tobacco) for families with incomes between $10,000 and $20,000 compared to families with incomes of $50,000 or more.

Because not all families with similar incomes spend the same amount on each of the taxed items, the incidence of an increase in excise taxes would vary greatly within income classes. For expenditures other than on airfare, both the proportion of families with expenditures and the percent of expenditures within 50 percent of the average generally are smallest for families with incomes of less than $10,000. Thus, the incidence of tax increases would vary the most within the lowest income classes.

Increases in the tax on gasoline or telephone services would produce less variation in the incidence of a tax increase among families with similar incomes than would increases in any of the other excise taxes. More than 90 percent of families in all income classes have expenditures on telephone services and, with the exception of families with incomes of less than $10,000, on gasoline. About two-thirds of gasoline and telephone service expenditures are within 50 percent of the average expenditure within each income class (except, again, for gasoline expenditures in the lowest income classes).

A complete analysis of the incidence of an increase in excise taxes includes the effect on relative prices and the effect on personal income. An increase in excise taxes would increase the price of the taxed item relative to the price of other goods and services. Families who spend less than the average amount on the taxed items would be relatively better off, while families who spend more than average would be relatively worse off. An increase in excise taxes would reduce the real value of business receipts, thereby lowering the amount paid out in wages and returns to shareholder investments. With a reduction in these payments, the aggregate real income of workers and investors will fall by the amount of the tax.

When the effects of an excise tax increase on the prices of other goods and services are considered, families in most income classes would neither gain nor lose, on average, from an increase in the tax on wine or distilled spirits. The higher price for those goods would be offset by relatively lower prices for other goods and services. Families in the highest income class would gain on average from an increase in the taxes on gasoline, beer, tobacco, and telephone services. When the effects on relative prices are considered, families in the lowest income classes still would lose on average from an increase in the taxes on tobacco or telephone services, although the amount of loss, whether measured as a percentage of income or as a percentage of total expenditures, would be reduced.

If the reduction in real personal income because of an excise tax increase is distributed proportionally across all wage and investment income, the distributional effects of each excise tax increase would be

more progressive than when only the effects on relative prices are considered. Measured relative to total expenditures, the burden of any of the tax increases (except for tobacco) would be the smallest for families with incomes of $10,000 or less.

Distributing the reduction in personal income proportionally across all wage and investment income does not change the relative ranking among the alternative tax increases according to their distributional effects. If the reduction in income were distributed differently for each separate tax increase--for example, with a larger share going to workers and investors in the industry that produced the good or service that was being taxed--the relative ranking according to distributional effects could change when the full incidence of the tax was included.

INTRODUCTION

In fiscal year 1985, revenues from all federal excise taxes were $36 billion, approximately 5 percent of total federal revenues in that year. Continuing pressures to reduce federal deficits have caused some to consider increasing excise taxes. In this paper, the Congressional Budget Office (CBO) analyzes the distributional effects, by income class, of separate increases in selected excise taxes. For each tax, the simulated increase in the tax rate is designed to generate an additional $1 billion in gross excise tax revenues before inclusion of the associated reduction in income taxes. Increases are simulated for excise taxes on beer, wine, distilled spirits (liquor), tobacco, gasoline, air passenger tickets, and

communications (telephone service). These taxes accounted for approximately 65 percent of total federal excise tax liabilities (almost 80 percent of excise tax liabilities excluding the windfall profit tax) in 1985.

The distributional consequences are only one of a number of criteria for comparing the merits of revenue-equivalent increases in different federal excise taxes. Revenues from some excise taxes are earmarked for specific outlays. Revenues from the federal excise tax on gasoline go into the Highway Trust Fund which is used to finance construction and improvements of highways, bridges, and mass transit facilities; revenues from the tax on airline tickets go into the Airport and Airway Trust Fund.

Other excise taxes can be seen as compensation for the social costs that society in general ultimately bears because of certain activities. For example, the tax on tobacco products may offset some of the higher medical costs that smokers incur, while the tax on alcoholic beverages may offset some of the social costs from alcoholism and alcohol-related automobile accidents.

In the first section of this paper, CBO presents data on the distribution of consumer expenditures, by income class, on the seven commodities. The next section then analyzes the distribution of excise tax payments on those expenditures. The third section shows simulated distributional effects of a $1 billion increase in gross revenues from each tax considered in turn. In the final section, CBO analyzes the full incidence of these

excise tax increases, including their effects on relative prices, consumer incomes, and income tax payments.

DISTRIBUTION OF CONSUMER EXPENDITURES

Table 1 shows the distribution, by income class, of average family expenditures on the seven taxed commodities. The income and expenditure data in the table were taken from the 1982-1983 Consumer Expenditure Survey (CES) Interview Survey and have been aged to 1985 using the growth rate in per capita expenditures and per capita income between 1982-1983 and 1985.1/

Taxable Expenditures as a Percent of Income

For each type of expenditure except airfare, expenditures as a percent of income fall as income rises (see the second row for each type of expenditure in Table 1). Airfare expenditures rise slightly as a percent of income for families with incomes of $40,000 or more. Expenditures for gasoline and telephone service show the largest decline in expenditures as

1. The 1982-1983 Consumer Expenditure Survey consists of two parts: (1) the Interview Survey in which consumer units (families) are interviewed every three months and (2) the Diary Survey in which families record their purchases over a one-week period. The interview survey is designed to obtain information on the types of expenditures that consumers can be expected to recall over a long period of time. It reports only combined expenditures for beer and wine consumed at home, and combined expenditures for all alcoholic beverages consumed away from home. Factors derived from the diary survey, in which separate expenditures for beer, wine, and distilled spirits are reported both for consumption at home and away, are used to allocate the combined alcoholic beverage expenditures reported in the interview survey. For more information on the complete 1982-1983 survey, see Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Survey: Interview Survey, 1982-1983, Bulletin 2246; and Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Survey: Diary Survey, 1982-1983, Bulletin 2245.

TABLE 1. AVERAGE INCOME, AVERAGE TOTAL EXPENDITURES, AND AVERAGE EXPENDITURES SUBJECT TO FEDERAL EXCISE TAX, BY INCOME CLASS, 1985

	All Incomes	Less Than $5,000	$5,000-$9,999	$10,000-$19,999	$20,000-$29,999	$30,000-$39,999	$40,000-$49,999	$50,000 Or More
Average Income ($)	26,502	2,311	7,401	14,764	24,750	34,630	44,539	72,016
Share of Total Income (%)	100.0	0.8	4.1	13.3	17.1	17.5	14.1	33.0
Average Total Expenditures ($)	22,828	9,690	10,838	16,195	22,514	27,892	34,007	47,382
Share of Total Expenditures (%)	100.0	3.8	7.0	17.0	18.0	16.4	12.5	25.2
Average Gasoline Expenditures ($)	995	394	453	801	1,111	1,309	1,459	1,639
As a % of income	3.75	17.04	6.12	5.42	4.94	3.78	3.28	2.28
As a % of all expenditures	4.36	4.06	4.18	4.94	4.93	4.69	4.29	3.46
Share of Gasoline Expenditures (%)	100.0	3.6	6.7	19.2	20.4	17.7	12.3	20.0
Average Beer Expenditures ($)	310	159	157	265	341	414	399	472
As a % of income	1.17	6.89	2.12	1.80	1.38	1.19	0.90	0.66
As a % of all expenditures	1.36	1.64	1.44	1.64	1.51	1.48	1.17	1.00
Share of Beer Expenditures (%)	100.0	4.7	7.5	20.5	20.1	17.9	10.8	18.5
Average Wine Expenditures ($)	72	32	30	53	70	89	108	154
As a % of income	0.27	1.38	0.40	0.36	0.28	0.26	0.24	0.21
As a % of all expenditures	0.32	0.33	0.27	0.33	0.31	0.32	0.32	0.32
Share of Wine Expenditures (%)	100.0	4.1	6.1	17.4	17.7	16.5	12.5	25.8
Average Liquor Expenditures ($)	197	88	88	150	203	254	267	381
As a % of income	0.74	3.81	1.19	1.02	0.82	0.73	0.60	0.53
As a % of all expenditures	0.86	0.91	0.81	0.93	0.90	0.91	0.79	0.80
Share of Liquor Expenditures (%)	100.0	4.1	6.6	18.2	18.9	17.3	11.4	23.5
Average Tobacco Expenditures ($)	344	182	247	318	394	441	435	390
As a % of income	1.30	7.89	3.33	2.15	1.59	1.27	0.98	0.54
As a % of all expenditures	1.51	1.88	2.27	1.96	1.75	1.58	1.28	0.82
Share of Tobacco Expenditures (%)	100.0	4.8	10.6	22.1	20.9	17.2	10.6	13.8
Average Telephone Expenditures ($)	432	284	305	384	435	500	532	641
As a % of income	1.63	12.30	4.12	2.60	1.76	1.44	1.20	0.89
As a % of all expenditures	1.89	2.93	2.82	2.37	1.93	1.79	1.57	1.35
Share of Telephone Expenditures (%)	100.0	6.0	10.4	21.3	18.4	15.5	10.4	18.0
Average Airfare Expenditures ($)	201	67	64	134	174	204	299	573
As a % of income	0.76	2.91	0.87	0.90	0.70	0.59	0.67	0.80
As a % of all expenditures	0.88	0.69	0.59	0.82	0.77	0.73	0.88	1.21
Share of Airfare Expenditures (%)	100.0	3.0	4.7	15.9	15.8	13.6	12.5	34.5

SOURCE: CBO tabulations based on data from the Consumer Expenditure Survey: Interview Survey, 1982-1983. Income and expenditure data have been aged to 1985 and adjusted for underreporting of taxable expenditures.

a percent of income between the lowest and highest income classes. Families with incomes of less than $5,000 spend 17 percent of their income on gasoline, compared with just over 2 percent for families with incomes of $50,000 or more. Families in the lowest income class spend about 12 percent of their income on telephone service; families in the highest income class spend just under 1 percent.

Taxable Expenditures as a Percent of Total Expenditures

Expenditures are shown as a percentage of total expenditures as well as a percentage of income. Because income is measured over a single year, expenditures expressed as a percent of income may overstate the fraction of permanent income spent on that good. Families whose income may have fallen temporarily are likely to maintain their previous level of consumption in the expectation that their income will return to normal levels.2/ Because total expenditures are generally thought to reflect long-term incomes, total expenditures may be a better measure of a family's permanent economic condition than income from a single year. Expenditures on each item expressed as a percentage of total expenditures may better approximate the fraction of income spent on each good over a longer time period.

---

2. Because 1982 and 1983 were years of high unemployment, this may be particularly true for the data presented in the table. The comparison of expenditures and income is further complicated by the survey design. Families were interviewed every three months over a 12-month period about their expenditures during the previous three months. Each interview is treated as a separate observation in the table. Income information was collected at the beginning and the end of the 12-month cycle about income received in the previous 12 months. Thus, for many observations, reported expenditures may have occurred just after the period during which reported income was received.

Expenditures for all seven items are much more constant across income classes when measured as a percentage of total expenditures rather than as a percentage of total income. Expenditures for liquor and wine vary little among income classes; gasoline, beer, and airfare expenditures are almost constant except for the highest income class, with airfare differing from the other two items in that the percentage of total expenditures increases rather than decreases for families with incomes of $50,000 or more. Tobacco and telephone expenditures measured as a percentage of total expenditures retain the observed pattern when measured as a percentage of income, declining as income rises. However, smaller differences exist between the highest and lowest income groups when measured relative to total expenditures than to income.

The difference between the distribution of taxable expenditures measured as a percentage of income and of total expenditures is best illustrated by the distribution of gasoline expenditures. Gasoline expenditures as a fraction of income fall sharply as income rises. When measured as a fraction of total expenditures, however, gasoline expenditures are mostly constant across income classes, falling slightly in both the highest and lowest groups. Thus, a tax on gasoline would impose a heavy one-year burden on any family whose income is low in a certain year, but the long-term burden would be more nearly the same for most families, to the extent that total expenditures reflect long-term family incomes.

Methods for Computing Taxable Expenditures

To facilitate comparison of expenditures for the different items, expenditures were adjusted for underreporting. The proportion of total consumer expenditures reported on the survey varies by the type of expenditure. For example, after adjusting the data to reflect the growth in per capita expenditures for each type of expenditure between 1982-1983 and 1985, expenditures reported on the survey for wine, gasoline, and telephone services were consistent with the total amount spent on those items in 1985 by the percentage of the population represented by the survey sample. However, beer expenditures were less than one-third the amount that should have been reported. If the data were not adjusted for underreporting, taxes on beer expenditures would appear to be a much smaller percentage of income and total expenditures than taxes on expenditures for which there was more complete reporting. To correct for this, all expenditure amounts were adjusted to reflect 1985 total consumer expenditures for those items as reported in the Survey of Current Business.3/

Total income is measured as the sum of wages and salaries, self-employment income, rents, interest, dividends, pensions, Social Security

---

3. Department of Commerce, Bureau of Economic Analysis. Survey of Current Business, vol. 66, no. 7, July 1986. The Survey of Current Business does not report separate expenditures for beer, wine, and distilled spirits. The total expenditure for alcoholic beverages, including purchases for on- and off-premise consumption, was divided among the three types of expenditures using factors of 53.4 percent for beer, 12.5 percent for wine, and 34.1 percent for distilled spirits. These factors were derived from estimates by the Distilled Spirits Council of the U.S., Inc., of total expenditures in 1985 on beer, wine, and distilled spirits.

benefits, and other social insurance payments.4/ Total expenditures are measured as the sum of all expenditures reported on the survey including employee contributions for pensions and Social Security. Total expenditures were not adjusted for underreporting but include the adjustments made to the separate expenditures listed in Table 1. Families are defined as one or more members of the same household who either are related or make joint decisions on expenditures.

Neither the aging of the data to 1985 nor the adjustments for underreporting change the distribution of expenditures by income class. The distribution retains the same characteristics as in the original data for 1982-1983. Thus the data in Table 1 would not capture either shifts in the distribution of expenditures since that time or a pattern of underreporting of expenditures that differs by income class.

Shares of Taxable Expenditures

Another way to compare the distribution of different expenditures by income class is to look at the share of expenditures of that type in each income class (see the fourth row for each type of expenditure in Table 1). Because the classes differ in size, expenditure shares would not be equally divided among classes even if all families spend the same amount. However,

4. Income in the highest income category was adjusted for topcoding. To maintain confidentiality, reported amounts of income of any type in excess of $75,000 for data collected in 1982 or $100,000 for data collected in 1983 were replaced with those amounts. Total income is the sum of those components and may include topcoded amounts. Total income for families in which some component of income was topcoded was adjusted using aggregate tax return data for high-income families for those years.

one can compare the share of expenditures of a particular type for an income class with the share of total expenditures for that class. By this measure, families with incomes under $10,000 account for a much larger share of tobacco and telephone expenditures and a slightly larger share of beer expenditures than their share of total expenditures. Conversely, for all commodities except wine and airfare, the share of expenditures for families with incomes of $40,000 or more is less than their share of total expenditures.

Distribution of Expenditures within Income Classes

The distribution of average expenditures across income classes hides important differences within each income class. First, not all families within a particular income class purchase all of the items. The percentage of families that do make expenditures is likely to be different at different income levels. Second, even for families that do make expenditures, the amount of expenditures may vary as much within each class as among classes.

The discretionary nature of some of the expenditures can be seen in Table 2, which shows the distribution, by income, of the percent of families with expenditures, average expenditures for families with expendi-

TABLE 2. AVERAGE EXPENDITURES FOR FAMILIES WITH EXPENDITURES SUBJECT TO FEDERAL EXCISE TAX, BY INCOME CLASS, 1985

	All Incomes	Less Than $5,000	$5,000-$9,999	$10,000-$19,999	$20,000-$29,999	$30,000-$39,999	$40,000-$49,999	$50,000 Or More
Families with Gasoline Expenditures								
Percent of all families	91.6	52.0	71.4	93.0	98.7	99.6	99.4	100.0
Average gasoline expenditures	1,144	667	578	821	1,215	1,304	1,481	1,709
Percent within 50% of the average	65.1	43.6	43.8	64.5	70.7	69.7	72.2	67.2
Families with Beer Expenditures								
Percent of all families	72.0	34.3	44.6	68.3	80.3	79.8	84.9	91.6
Average beer expenditures	414	255	323	358	432	548	370	436
Percent within 50% of the average	38.0	24.2	31.4	33.0	36.5	36.5	42.4	51.7
Families with Wine Expenditures								
Percent of all families	72.0	34.3	44.6	68.3	80.3	79.8	84.9	91.6
Average wine expenditures	103	44	55	64	85	117	117	197
Percent within 50% of the average	38.1	21.1	32.5	33.2	36.4	37.2	41.4	51.6
Families with Liquor Expenditures								
Percent of all families	66.1	25.6	38.4	59.8	74.0	73.9	82.7	89.8
Average liquor expenditures	299	213	196	212	295	379	266	423
Percent within 50% of the average	36.1	25.6	28.6	32.8	37.2	32.0	36.1	47.9
Families with Tobacco Expenditures								
Percent of all families	50.1	37.0	40.2	51.5	54.2	55.1	50.8	50.3
Average tobacco expenditures	657	480	536	589	690	760	719	716
Percent within 50% of the average	58.8	57.7	57.7	56.1	65.0	61.0	56.8	53.5
Families with Telephone Expenditures								
Percent of all families	98.4	90.9	96.3	98.6	99.1	99.8	99.8	99.3
Average telephone expenditures	447	311	308	389	446	486	526	650
Percent within 50% of the average	65.6	59.0	66.0	60.6	62.2	72.8	71.3	70.1
Families with Airfare Expenditures								
Percent of all families	24.4	9.5	7.4	17.8	22.3	29.2	31.1	54.4
Average airfare expenditures	829	434	463	700	790	787	990	976
Percent within 50% of the average	48.9	51.9	57.7	53.5	54.1	52.7	40.6	42.2

SOURCE: CBO tabulations based on data from Consumer Expenditure Survey: Interview Survey, 1982-1983. Income and expenditure data have been aged to 1985 and adjusted for underreporting of taxable expenditures. Expenditure information is given only for families with four consecutive quarters of expenditures.

tures, and the percentage of families with expenditures who spend within 50 percent of the average for that income class.5/

Almost all families make expenditures on gasoline and telephone service, between two-thirds and three-fourths of families spend money on various alcoholic beverages, about one-half purchase tobacco products, and less than one-quarter have expenditures on airfare. The percentage of families with expenditures varies by income. The greatest differences in the percentage of families with expenditures are for alcoholic beverages and airfare, while the least difference is for telephone service.

There are also differences among types of expenditures in the variation of expenditures around the mean. Almost two-thirds of gasoline and telephone expenditures fall within 50 percent of the average expenditure (between $572 and $1,716 for gasoline and between $224 and $671 for telephone). However, less than 40 percent of alcoholic beverage expenditures are within 50 percent of the average.

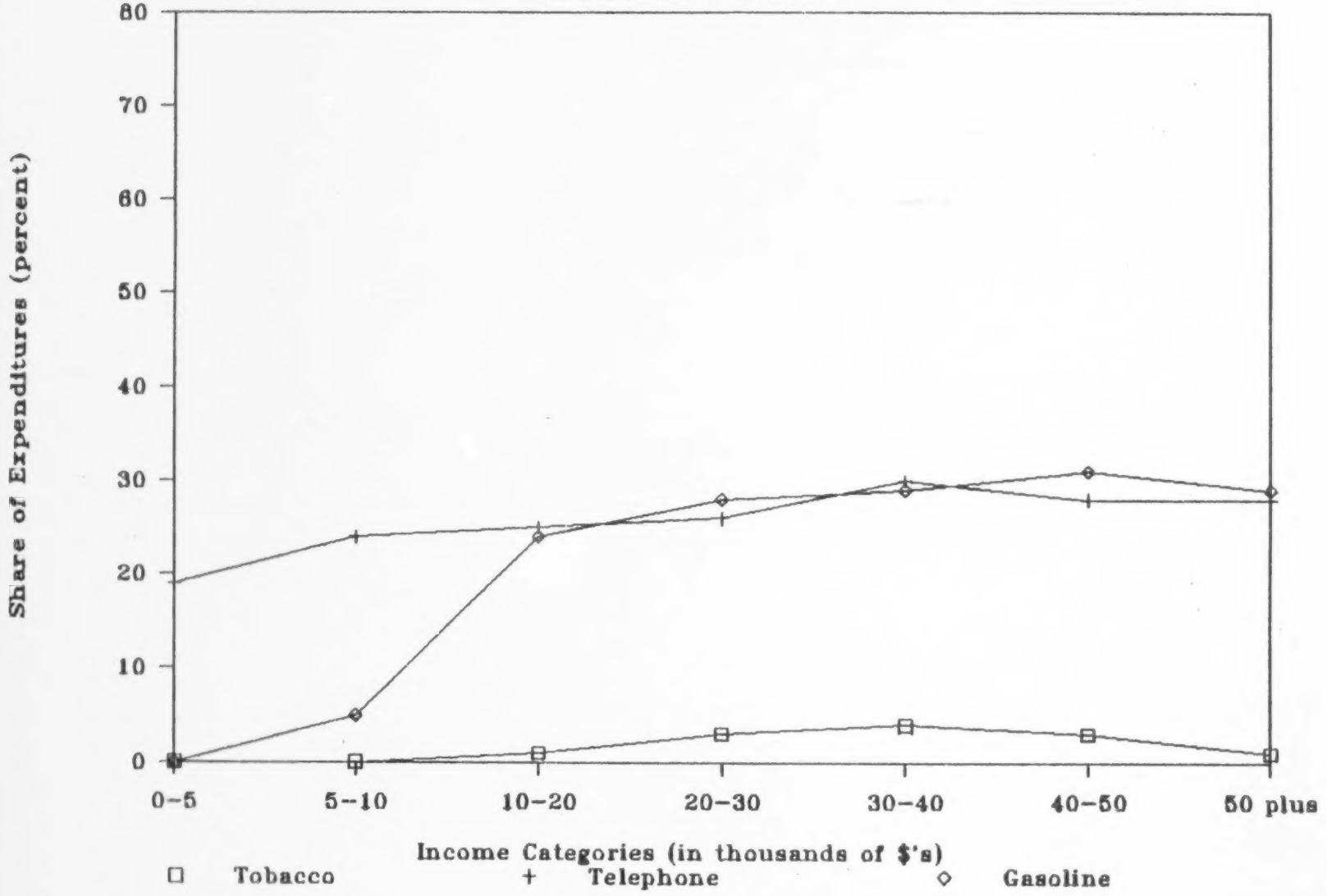
The dispersion of expenditures within income classes is further illustrated by Figures 1 and 2. Figure 1 shows the share of expenditures on tobacco, gasoline, and telephone services made by the bottom 50 percent of families within each income class, where families are ordered according to the amount of their expenditures on each item. Figure 2 shows the share of expenditures made by the top 20 percent of families.

---

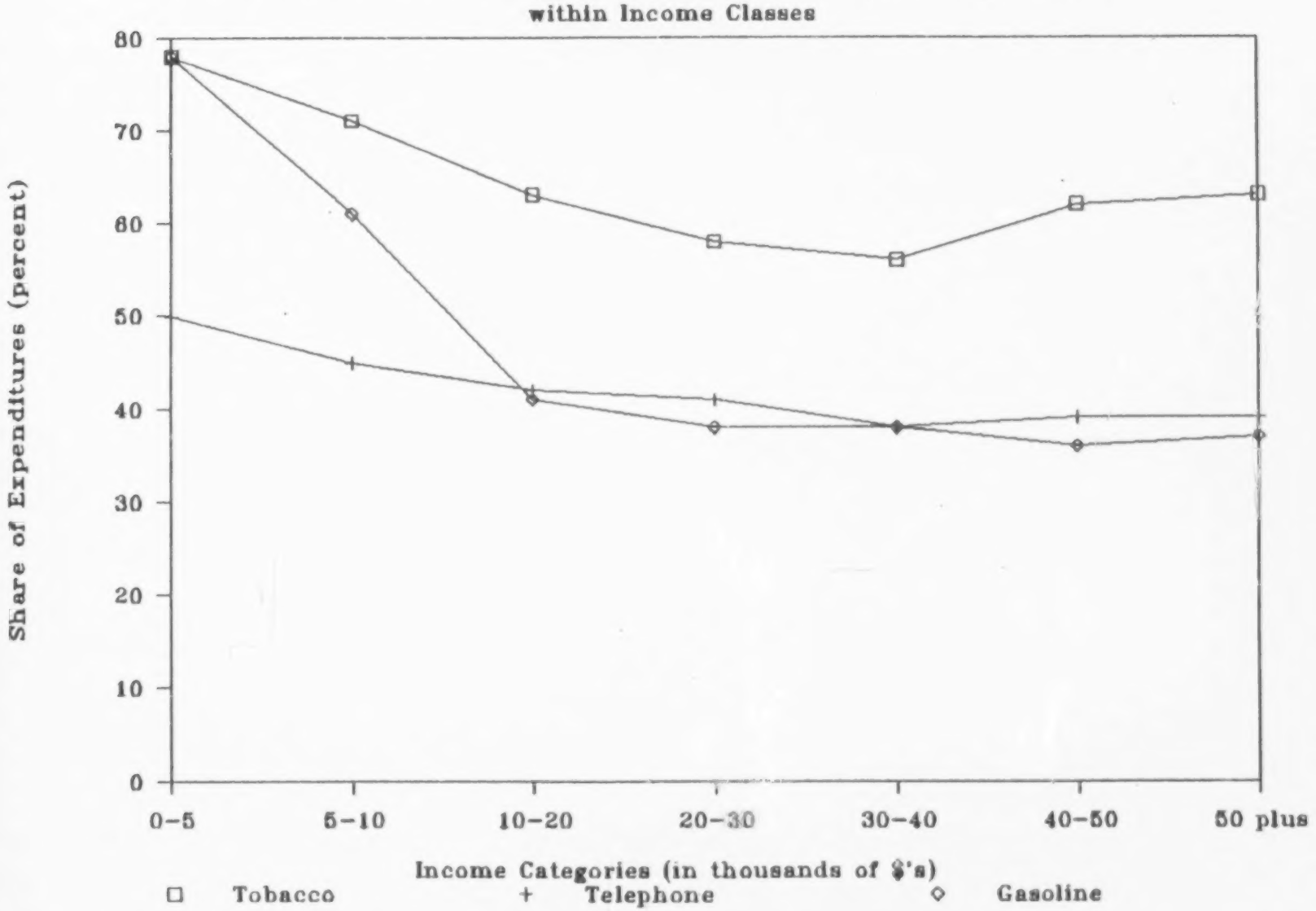
5. To eliminate variations caused by quarter-to-quarter fluctuations in spending, only data for families with four consecutive quarters of expenditure information were used in constructing Table 2.

Share of Expenditures by Bottom 50%

within Income Classes



Share of Expenditures by Top 20%



Because expenditures for telephone services do not vary a great deal among families with the same incomes, except for families in the lowest income class, the lines indicating shares of expenditures for telephone services are nearly horizontal. Within each income class, the 50 percent of families who spend the least on telephone service make about 25 percent to 30 percent of the expenditures, while the 20 percent who spend the most make about 40 percent of the expenditures.

In contrast, expenditures for tobacco vary a great deal within each income class, with the greatest dispersion among low-income families. Within each income class, about 50 percent of families purchase almost no tobacco. Among low-income families, the 20 percent of families who spend the most on tobacco make about 75 percent of all tobacco purchases, while among middle-income families, the 20 percent who spend the most make between 55 percent and 60 percent of tobacco purchases.

The lines showing expenditure shares for gasoline have a pattern similar to those for telephone services for families with incomes of $10,000 or more; above that level of income, families with the same income spend roughly the same amount on gasoline. However, for low-income families, there is greater divergence in gasoline expenditures.

These results suggest that the incidence of excise taxes within income classes varies a great deal. This variation may be appropriate for excise taxes that are intended to penalize or discourage the purchase of certain commodities and for excise taxes designed primarily as user fees.

For example, taxes on tobacco and alcoholic beverages serve to discourage consumption of those items and revenues from the gasoline excise tax go into the Highway Trust Fund, which is used to finance the construction and repair of federal highways. However, differences in the amount of expenditures for certain items result in a tax burden from selective excise taxes that is less horizontally equitable than a tax on more broadly based consumption. With selective excise taxes, families in nearly identical economic circumstances can pay very different amounts of tax.

DISTRIBUTION OF EXCISE TAX LIABILITIES

Table 3 shows the distribution of excise tax liabilities by income class. Tax liabilities were calculated by CBO based on the taxable expenditure data presented in the previous section.

Taxes as a Percent of Income

As a percentage of income, taxes are highest in the lowest income class for all seven types of expenditures. Taxes as a percentage of income fall by about one-half for most types of expenditures between families with incomes of $10,000 to $20,000 and families with incomes of $50,000 or more. However, tobacco taxes as a percent of income are less than one-fourth as large for families in the highest income class compared to families with incomes of $10,000 to $20,000.

TABLE 3. AVERAGE EXCISE TAX FOR EXPENDITURES SUBJECT TO FEDERAL EXCISE TAX, BY INCOME CLASS, 1985

	All Incomes	Less Than $5,000	$5,000-$9,999	$10,000-$19,999	$20,000-$29,999	$30,000-$39,999	$40,000-$49,999	$50,000 Or More
Average Combined Excise Tax ($)	252	113	129	201	267	317	353	439
As a % of income	0.95	4.89	1.74	1.36	1.08	0.92	0.79	0.61
As a % of all expenditures	1.10	1.17	1.19	1.24	1.18	1.14	1.04	0.93
Share of Combined Excise Tax	100.0	4.1	7.6	19.1	19.4	16.9	11.8	21.2
Average Gasoline Excise Tax ($)	93	37	43	73	102	121	137	161
As a % of income	0.35	1.62	0.58	0.50	0.41	0.35	0.31	0.22
As a % of all expenditures	0.41	0.39	0.39	0.45	0.45	0.43	0.40	0.34
Share of Gasoline Excise Tax	100.0	3.6	6.8	18.8	20.0	17.4	12.4	21.0
Average Beer Excise Tax ($)	17	9	9	14	19	23	23	28
As a % of income	0.06	0.37	0.12	0.10	0.07	0.07	0.05	0.04
As a % of all expenditures	0.08	0.09	0.08	0.09	0.08	0.08	0.07	0.06
Share of Beer Excise Tax	100.0	4.5	7.4	19.8	19.7	17.6	11.2	19.9
Average Wine Excise Tax ($)	4	2	2	3	4	5	6	8
As a % of income	0.01	0.07	0.02	0.02	0.02	0.01	0.01	0,01
As a % of all expenditures	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Share of Wine Excise Tax	100.0	4.0	6.3	17.3	17.8	16.5	12.5	25.7
Average Liquor Excise Tax ($)	39	17	18	29	40	50	54	76
As a % of income	0.15	0.75	0.24	0.20	0.16	0.14	0.12	0.11
As of % of all expenditures	0.17	0.18	0.16	0.18	0.18	0.18	0.16	0.16
Share of Liquor Excise Tax	100.0	4.0	6.7	18.0	18.7	17.1	11.6	23.9
Average Tobacco Excise Tax ($)	46	24	33	42	52	58	58	52
As a % of income	0.17	1.05	0.44	0.29	0.21	0.17	0.13	0.07
As a % of all expenditures	0.20	0.25	0.30	0.26	0.23	0.21	0.17	0.11
Share of Tobacco Excise Tax	100.0	4.8	10.6	22.1	20.9	17.2	10.6	13.8
Average Telephone Excise Tax ($)	26	14	15	21	26	32	36	47
As a % of income	0.10	0.61	0.21	0.14	0.11	0.09	0.08	0.07
As a % of all expenditures	0.12	0.15	0.14	0.13	0.12	0.11	0.11	0.10
Share of Telephone Excise Tax	100.0	4.8	8.6	19.0	18.2	16.0	11.5	21.8
Average Airfare Excise Tax ($)	27	10	10	18	24	29	39	67
As a % of income	0.10	0.43	0.14	0.12	0.10	0.08	0.09	0.09
As a % of all expenditures	0.12	0.10	0.09	0.11	0.11	0.10	0.12	0.14
Share of Airfare Excise Tax	100.0	3.4	5.7	16.3	16.8	14.8	12.5	30.5

SOURCE: CBO tabulations based on data from Consumer Expenditure Survey: Interview Survey, 1982-1983. Income and expenditure data have been aged to 1985 and adjusted for underreporting of taxable expenditures. Taxes include indirect excise tax liabilities.

Taxes as a Percent of Total Expenditures

Taxes are more nearly constant across all income classes as a percent of expenditures than as a percent of income (see the third and second rows, respectively, for each type of tax in Table 3). When measured as a percent of total expenditures, however, tobacco taxes still fall by more than one-half between families with incomes of $10,000 to $20,000 and families with incomes of $50,000 or more. Telephone taxes measured as a percent of total expenditures decline gradually as income rises.

Methods for Computing Excise Tax Liabilities

Excise taxes for gasoline, beer, wine, distilled spirits, and tobacco are levied on a per unit basis where the tax rate is a fixed amount per unit of sale. For example, gasoline is taxed at $.09 per gallon, cigarettes at $.16 per pack of 20 cigarettes, beer at $.29 per gallon, distilled spirits at $12.50 per gallon, and wine at rates ranging from $.17 to $3.40 per gallon. Excise taxes on airline tickets and telephone service are levied on an *ad valorem* basis in which the tax is expressed as a constant fraction of the price of the commodity. The tax rate for local and long-distance telephone service is 3 percent of the amount paid; for air passenger tickets, 8 percent of the airfare.6/

---

6. The tax rate for air passenger tickets is 8 percent of the airfare for domestic travel but $3.00 per person for international departures. The data were treated as if all expenditures for air travel were for domestic flights.

The data used for this study do not identify the quantity of each item purchased. Rather, they indicate only how much was spent on a particular commodity. While this was not a problem for *ad valorem* taxes, it was necessary to convert unit tax rates to *ad valorem* tax rates.

Because of the lack of comprehensive price data for beer, wine, and distilled spirits, and because of the varying unit tax rates on different types of wine and, to a lesser degree, on different types of tobacco purchases, the unit tax rate for these items could not be converted directly to an *ad valorem* rate. Rather, the tax rate for these commodities as a percent of the total price was computed as the ratio of total excise tax revenue to total expenditures. For gasoline, the *ad valorem* tax rate was computed as the ratio of the tax rate of $.09 per gallon of gasoline divided by an average price per gallon of $1.18.

Using these *ad valorem* tax rates, the amount of excise tax payments was calculated for each type of taxable expenditure. Purchasers of taxed goods were assumed to pay the full amount of the excise tax through higher prices.

The major drawback in using a single *ad valorem* rate for goods with a unit tax is that it implicitly assumes that all families pay the same price for purchases of the taxed items. This assumption is most troublesome for those expenditures in which there may be large differences in the quality of the item purchased. For example, all wine purchases are assumed to be taxed at the same rate whether the wine sells for $2 or $20 a bottle. A

single *ad valorem* tax rate for all wine expenditures will overstate the taxes paid by consumers who purchase wine at prices greater than the average and will understate taxes for those who purchase wine that is less expensive than average. If higher-income households generally purchase goods of higher quality, the assumption that an excise tax is proportional to expenditures on those goods will cause the tax to appear less regressive than it actually is.

Some portion of the total expenditure for certain commodities is made by business purchasers. The CBO analysis assumed that the ultimate incidence of the excise taxes for these purchases was borne by consumers. Thus, for example, gasoline taxes paid in the course of transporting other commodities were assumed to be reflected in the price consumers paid for those goods. The share of excise taxes paid by businesses was distributed to consumers in proportion to the total expenditures of each family.7/

---

7. In making these computations, business expenditures were assumed to be approximately 20 percent of total expenditures--excluding purchases made by the government--for beer, wine, distilled spirits, and gasoline, 50 percent for telephone service, and 45 percent for airfare. All tobacco expenditures were assumed to have been made by consumers. The business shares of total expenditures on beer, wine, and distilled spirits were based on estimates by the Distilled Spirits Council of the U.S., Inc., of the business share of total alcoholic beverage expenditures in 1984. The business shares of total expenditures on gasoline, telephone service, and airfare were based on the implied level of total expenditures in calendar year 1985 calculated by dividing excise tax revenues by the excise tax rate.

Shares of Excise Tax Liabilities

In general, the distribution of the share of taxes paid by each income class should look similar to the distribution of the share of family expenditures for each item. However, for those commodities where a larger percentage of the purchases are made by businesses, the distribution of the share of excise taxes paid will look more like the distribution of total family expenditures than the distribution of family expenditures on that item alone.

The fourth row for each type of expenditure in Table 3 shows the share of taxes paid by each income class. These shares reflect both the share of expenditures on the particular item and the share of total expenditures. Thus, although families with income of less than $10,000 accounted for 16.4 percent of direct telephone expenditures, the share of the telephone excise tax paid by these families was actually 13.4 percent when telephone expenditures by businesses are factored in.

Families with incomes of less than $10,000 pay at least 10 percent to 12 percent of excise taxes on gasoline and alcoholic beverages. These families pay about 13 percent of the telephone excise tax and about 15 percent of the tax on tobacco. Families in the highest income class pay between 20 percent and 25 percent of most excise taxes except those for airfare (31 percent) and tobacco (only 14 percent).

DISTRIBUTION OF EXCISE TAX INCREASES

This section traces the distributional effects of a $1 billion increase in excise tax revenues generated through increases in each of the excise taxes. The distributional results for a change in excise taxes reflect the distribution of expenditures and taxes previously presented.

The Congressional Budget Office has assumed that the full tax increase initially is passed forward to consumers through an increase in prices.8/ With no change in the quantity purchased, expenditures on the taxed commodities increase by the full amount of the tax increase. Because of the assumption that people buy less of most items when taxes on those items increase, expenditures increase by less than the full amount of the tax increase for goods with price elasticities other than zero.9/ The

---

8. An alternative assumption is that the tax increase is fully or partially shifted to factor incomes of producers of the taxed goods through reduced wages and dividends and that, consequently, there is no change or only a partial increase in prices. Because producers of the taxed commodities operate in generally competitive labor and capital markets, the tax increase probably could not be shifted to factor incomes. Other analysts have suggested that an excise tax increase would cause prices to rise by more than the amount of the tax increase because the tax is treated as a cost of production and producers follow a strategy of setting prices at some markup over costs. Such a price increase would not be stable, however, unless prices were below their optimal level before the imposition of the tax increase.

9. A price elasticity of -1.00 was used for airfare, -0.80 for distilled spirits, -0.40 for beer, wine, and tobacco products, -0.20 for gasoline, and 0.00 for telephone service. The price elasticity for tobacco products is consistent with recent empirical findings; see, for example, Eugene M. Lewit and Douglas Coate, "The Potential for Using Excise Taxes to Reduce Smoking," Journal of Health Economics, no. 1 (1982), pp. 121-145, who report a price elasticity for cigarettes of -0.42. The elasticity for beer is within the range found by Stanley I. Ornstern and David Levy, "Price and Income Elasticities and the Demand for Alcoholic Beverages," in Marc Galtner, ed., Recent Developments in Alcoholism, vol. I (New York: Plenum Press, 1983), pp. 303-345, who report an average price elasticity for beer of between -0.30 and -0.40. However, they also report an average price elasticity for distilled spirits of between -1.00 and -2.00. Rather than

percentage increase in tax rates for these goods therefore must exceed the percentage increase in tax revenues to generate the additional $1 billion in gross revenues.

Although a different elasticity was used for each tax increase, for any single tax increase the same elasticity value was used for all families. Thus, the distributional results are unaffected by the introduction of price elasticities. Using a constant price elasticity for each of the tax increases would only affect the percentage increase in tax rates necessary to generate an additional $1 billion in gross excise tax revenue. Actual distributional outcomes would differ from the simulated results if the response to an increase in excise taxes varied among families in relation to their income.

Table 4 shows excise tax liabilities in calendar year 1985 for the seven types of taxes and the percentage increase in tax rates necessary to produce an additional $1 billion in gross excise tax revenues from each of the taxes considered separately. The percentage increase in tax rates is shown with and without adjustments for a decrease in the quantity of the item purchased.

The increase in average excise tax liabilities with an alternative $1 billion increase in gross revenues from each of the seven excise taxes is shown in Table 5. The increase in taxes paid by businesses that purchase

---

use this result, CBO elected to use elasticities for distilled spirits, wine, airfare, gasoline, and telephone service that reflect estimates used by the Department of Treasury.

Table 4. Tax Revenues and Tax Increases Necessary to Generate an Additional $1 Billion in Gross Excise Tax Revenues, 1985

Type of Tax	Calendar Year 1985 Excise Tax Liabilities (Billions of dollars)	Percentage Increase in Tax Rate Necessary to Produce an Additional $1 Billion in Gross Tax Revenues	
		Without Quantity Response	With Quantity Response
Gasoline	8.60	11.6	11.8
Beer	1.59	62.9	64.8
Wine	0.36	280.5	301.0
Distilled Spirits	3.60	27.8	33.4
Tobacco	4.22	23.7	25.4
Telephone	2.45	40.9	40.9
Airfare	2.45	40.9	45.8

SOURCE: Congressional Budget Office.

the taxed goods have been distributed to consumers in proportion to their total expenditures. Thus all taxes generate the same average increase in tax payments.

With a simulated $1 billion increase in gross excise tax revenues, the average tax increases would be small--approximately $11 per family--or about .04 percent of total income and .05 percent of total expenditures. For the lowest income class, the tax increase from any of the taxes considered would be between 0.2 percent and 0.3 percent of income, and less than 0.1 percent of total expenditures.

Using a measure of the tax increase as a percent of total expenditures, the results suggest that, except for an increase in the tobacco tax, there would not be strong reasons to prefer one tax increase over another

TABLE 5. CHANGE IN AVERAGE EXCISE TAX FOR ALL FAMILIES, BY INCOME CLASS, 1985

	All Incomes	Less Than $5,000	$5,000-$9,999	$10,000-$19,999	$20,000-$29,999	$30,000-$39,999	$40,000-$49,999	$50,000 Or More
Increase in Gasoline Excise Tax ($)	11	4	5	9	12	14	16	19
As a % of income	0.04	0.19	0.07	0.06	0.05	0.04	0.04	0.03
As a % of all expenditures	0.05	0.04	0.05	0.05	0.05	0.05	0.05	0.04
Share of Gasoline Tax Increase	100.0	3.6	6.8	18.8	20.0	17.4	12.4	21.0
Increase in Beer Excise Tax ($)	11	5	5	9	12	14	14	18
As a % of income	0.04	0.23	0.07	0.06	0.05	0.04	0.03	0.02
As a % of all expenditures	0.05	0.06	0.05	0.06	0.05	0.05	0.04	0.04
Share of Beer Tax Increase	100.0	4.5	7.4	19.8	19.7	17.6	11.2	19.9
Increase in Wine Excise Tax ($)	11	5	5	8	11	13	16	23
As a % of income	0.04	0.20	0.06	0.05	0.04	0.04	0.04	0.03
As a % of all expenditures	0.05	0.05	0.04	0.05	0.05	0.05	0.05	0.05
Share of Wine Tax Increase	100.0	4.0	6.3	17.3	17.8	16.5	12.5	25.7
Increase in Liquor Excise Tax ($)	11	5	5	8	11	14	15	21
As a % of income	0.04	0.21	0.07	0.06	0.04	0.04	0.03	0.03
As a % of all expenditures	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.04
Share of Liquor Tax Increase	100.0	4.0	6.7	18.0	18.7	17.1	11.6	23.9
Increase in Tobacco Excise Tax ($)	11	6	8	10	12	14	14	12
As a % of income	0.04	0.25	0.10	0.07	0.05	0.04	0.03	0.02
As a % of all expenditures	0.05	0.06	0.07	0.06	0.05	0.05	0.04	0.03
Share of Tobacco Tax Increase	100.0	4.8	10.6	22.1	20.9	17.2	10.6	13.8
Increase in Telephone Excise Tax ($)	11	6	6	9	11	13	15	19
As a % of income	0.04	0.25	0.09	0.06	0.04	0.04	0.03	0.03
As a % of all expenditures	0.05	0.06	0.06	0.05	0.05	0.05	0.04	0.04
Share of Telephone Tax Increase	100.0	4.8	8.6	19.0	18.2	16.0	11.5	21.8
Increase in Airfare Excise Tax ($)	11	4	4	7	10	12	16	27
As a % of income	0.04	0.18	0.06	0.05	0.04	0.03	0.04	0.04
As a % of all expenditures	0.05	0.04	0.04	0.05	0.04	0.04	0.05	0.06
Share of Airfare Tax Increase	100.0	3.4	5.7	16.3	16.8	14.8	12.5	30.5

SOURCE: CBO simulations based on data from Consumer Expenditure Survey: Interview Survey, 1982-1983. Income and expenditure data have been aged to 1985 and adjusted for underreporting of taxable expenditures. Taxes include indirect excise tax liabilities.

on distributional grounds. An increase in the tax on telephone service would raise the tax burden on low-income families by slightly more than would increases in the tax on gasoline or alcoholic beverages, while an increase in the tax on airline tickets would raise the tax burden on high-income families by slightly more than would increases in all other taxes. An increase in the tax on tobacco would raise taxes as a percent of expenditures by more than twice as much for families with incomes below $10,000 than for families with incomes of $50,000 or more.

Within each income class, most of the burden of the tax increase would fall on those families with expenditures on the taxed items. Tax increases on expenditures for telephone services, for example, would be distributed across almost all low-income families, while tax increases on alcoholic beverages and tobacco would be distributed to only about one-third to two-fifths of families with incomes below $10,000. Table 5 shows the average increase in excise taxes for all families, not just for those families with expenditures of a particular type.

There are some differences in the share of the tax increase that would be paid by families in different income classes. The share of the tax increase for families with incomes of less than $10,000 would be the largest for tobacco taxes and the smallest for airfare taxes. Families with incomes between $10,000 and $30,000 would also fare the worst under a tobacco tax increase and fare the best under an airfare tax.

OVERALL INCIDENCE OF AN INCREASE IN EXCISE TAXES

The overall incidence of an increase in excise taxes consists of two elements: (1) a redistribution of income--from consumers who purchase the item against which the tax increase is levied, to other consumers as the price of the taxed item rises relative to the prices of other goods and services--and (2) a net decline in personal income from employment and investment.

Effect on Relative Prices

An increase in any given excise tax would increase the price of the taxed item relative to the price of other goods and services.10/ Consumers who do not purchase those items on which the excise tax is increased, or who purchase less than the average amount, would be relatively better off.

The result extends to entire income classes in which the share of expenditures on a taxed item is less than that income class's share of total expenditures. Table 6 illustrates the distribution of the increase in excise taxes offset by the decrease in the price of other goods and services. The gains from this price decrease are distributed to families in proportion to their total expenditures. Because the increase in the price of the item against which the increased excise tax is levied is offset by the relative decline in other prices, the average effect over all

10. This change in relative price will occur whether or not absolute prices are allowed to rise by the amount of the tax increase or are held constant--for example, by an appropriate monetary policy.

TABLE 6. CHANGE IN AVERAGE EXCISE TAX WITH OFFSETTING PRICE CHANGES, BY INCOME CLASS, 1985

	All Incomes	Less Than $5,000	$5,000-$9,999	$10,000-$19,999	$20,000-$29,999	$30,000-$39,999	$40,000-$49,999	$50,000 Or More
Change in Gasoline Excise Tax ($)	0	0	0	1	1	1	0	-3
As a % of income	0.00	-0.01	0.00	0.01	0.00	0.00	0.00	-0.01
As a % of all expenditures	0.00	0.00	0.00	0.01	0.01	0.00	0.00	-0.01
Change in Beer Excise Tax ($)	0	1	0	1	1	1	-1	-4
As a % of income	0.00	0.03	0.00	0.01	0.00	0.00	0.00	-0.01
As a % of all expenditures	0.00	0.01	0.00	0.00	0.00	0.00	-0.01	-0.01
Change in Wine Excise Tax ($)	0	0	0	0	0	0	0	0
As a % of income	0.00	0.01	-0.01	0.00	0.00	0.00	0.00	0.00
As a % of all expenditures	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00
Change in Liquor Excise Tax ($)	0	0	0	0	0	1	0	0
As a % of income	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
As a % of all expenditures	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Change in Tobacco Excise Tax ($)	0	1	3	2	2	1	-1	-9
As a % of income	0.00	0.05	0.04	0.02	0.01	0.00	-0.01	-0.01
As a % of all expenditures	0.00	0.01	0.02	0.01	0.01	0.00	-0.01	-0.02
Change in Telephone Excise Tax ($)	0	1	1	1	0	0	0	-2
As a % of income	0.00	0.05	0.02	0.01	0.00	0.00	0.00	0.00
As a % of all expenditures	0.00	0.01	0.01	0.01	0.00	0.00	0.00	-0.01
Change in Airfare Excise Tax ($)	0	0	0	0	0	0	0	5
As a % of income	0.00	-0.02	-0.01	0.00	0.00	0.00	0.00	0.01
As a % of all expenditures	0.00	-0.01	-0.01	0.00	0.00	0.00	0.00	0.01

SOURCE: CBO simulations based on data from Consumer Expenditure Survey: Interview Survey, 1982-1983. Income and expenditure data have been aged to 1985 and adjusted for underreporting of taxable expenditures. Taxes include indirect excise tax liabilities.

families would be zero. Families in those income classes that spend relatively less on the taxed item would gain on average; families in income classes that spend relatively more would lose. However, because of the relatively small changes in average taxes associated with a $1 billion increase in gross excise tax revenues, the absolute size of the gains and losses would be small.

As the table shows, families in the highest income class either would be unaffected or would gain on average because of the change in relative prices resulting from an increase in any of the excise taxes except the airline ticket tax. This result occurs because families with income of $50,000 or more have a larger share of total expenditures than of expenditures for any of the taxed items except airfare. Families in the lowest income class would lose on average because of the change in relative price resulting from an increase in the tax on tobacco and telephone service, because their share of these expenditures is larger than their share of total expenditures.

Effect on Consumer Incomes and Income Tax Payments

An increase in an excise tax not only would affect relative prices but would reduce consumer incomes as well. CBO has assumed that a tax increase would not change the gross national product. In this case, an increase in excise tax payments would reduce the amount of business receipts that can be paid out in wages and returns to shareholder investments by the amount of the tax increase. With a reduction in these payments, the aggregate

income of workers and investors in the economy will fall by the amount of the tax. This decline in personal income would have certain distributional implications. First, personal income from indexed transfer payments, such as Social Security or Supplemental Security Income (SSI) benefits, would not be affected. Second, a reduction in income would reduce income tax revenues, offsetting some of the increase in excise tax revenues.

The distribution of the reduction in income and the distribution of the income tax offsets produced by a $1 billion increase in gross excise tax revenues are shown in Table 7. The reductions in income have been allocated in proportion to family income excluding Social Security and SSI benefits. Income tax offsets have been computed at the average marginal income tax rate for each income class.11/

Families in the highest income class would have the greatest share of the reduction in income, about 37 percent, but also the greatest share of the reduction in income taxes, about 48 percent. Although the income of low-income families would fall slightly, they would receive little benefit from the income tax reduction.

The combination of the effect on relative prices and the effect on consumer incomes can be illustrated for families in two different income classes using the results for an increase in the tax on tobacco. With an

---

11. This reduction in income is balanced by the increase in government revenues from the increase in excise taxes. It is difficult to attribute distributional effects to the revenue increase, however, particularly if, as is likely, the money is used to reduce the federal deficit.

TABLE 7. AVERAGE INCOME REDUCTION AND AVERAGE INCOME TAX OFFSET, BY INCOME CLASS, 1985

	All Incomes	Less Than $5,000	$5,000-$9,999	$10,000-$19,999	$20,000-$29,999	$30,000-$39,999	$40,000-$49,999	$50,000 Or More
Average Reduction in Income ($)	11	1	2	5	10	15	20	32
As a % of total income	0.04	0.03	0.02	0.03	0.04	0.04	0.04	0.05
As a % of total expenditures	0.05	0.01	0.02	0.03	0.04	0.05	0.06	0.07
Share of Reduction in Income	100.0	0.6	2.2	10.4	16.4	18.4	15.3	36.6
Average Income Tax Offset ($)	3	0	0	1	2	4	6	12
As a % of total income	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.02
As a % of total expenditures	0.01	0.00	0.00	0.00	0.01	0.01	0.02	0.03
Share of Income Tax Offset	100.0	0.1	1.1	6.3	12.0	16.3	15.9	48.3

SOURCE: CBO simulations based on data from Consumer Expenditure Survey: Interview Survey, 1982-1983. Income and expenditure data have been aged to 1985 and adjusted for underreporting of taxable expenditures.

increase in tobacco taxes, families in the $10,000 to $20,000 income class would pay an average of $10 more in tobacco taxes (Table 5). However, the decline in prices of other goods and services would save families in that income class $8 on average, resulting in a net loss of $2 because of relative price changes (Table 6). Because of the decline in after-tax business receipts, the average income of families in that income class would decline by $5 (Table 7). This decline would be offset by an average reduction in income taxes of $1, resulting in a net reduction in income of $4. Thus, an increase in tobacco taxes that raises $1 billion in gross excise tax revenue would cost families in this income range an average of $6.

Compare this result with families with income between $40,000 and $50,000. The average increase in tobacco taxes for these families would be $14. After accounting for the decline in other prices, the net result would be an average gain of $1. However, the average loss in income for these families would be $20. After allowing for a $6 decline in income taxes, the net reduction in income would be $14. Thus the average cost of an increase in tobacco taxes for these families would be $13.

Because CBO has simulated a $1 billion increase in gross excise tax revenues, the absolute amount of these changes are small. A larger increase in excise taxes would produce proportionally larger average gains and losses.

These simulated distributional results for the overall incidence of the excise tax increases should not be taken too literally. A number of assumptions used in the analysis--for example, that the reduction in incomes is distributed proportionally to all factor income, or that the total gross national product remains constant--simply may not hold. As previously mentioned, the distributional results do not include the gains attributable to individual families from the way in which the government disposes of the additional tax revenues. However, the results illustrate that the overall distributional effects of the tax increase would depend not only on the distribution of expenditures on the taxed item, but also on the distribution of total expenditures and the distribution of total incomes.